

REQUEST FOR PROPOSALS

Biological Remediation

Issued by:

Salton Sea Authority

Responses Due: January 14, 2002

Project # CAL 99-001



Biological Remediation RFP

Background

The Salton Sea Authority is interested in determining if biological remediation can solve some or all water quality related problems of the Salton Sea. The Sea is a complex, saline, hypereutrophic water body in southern California. The closest cities include Coachella, Calipatria and Westmorland. The Sea resulted from a deliberate diversion of part of the Colorado River for irrigation purposes in 1905, which inadvertently caused extensive flooding of the Salton Basin.

The Sea is approximately 35 miles long by 10—13 miles wide. The average depth is 30', and at the deepest is about 50', with many very shallow areas. The surface elevation is 227' below sea level.

The Sea is presently sustained by about 1.35 million acre-feet of agricultural run-off from the Imperial and Coachella Valleys. It has no outlet. About 1.35 million acre-feet of water simultaneously evaporates from the Salton Sea annually, hence, the water level is essentially constant. However, through this process the annual salt load accruing to the Salton Sea is approximately 4,000,000 tons. The total dissolved solids "salt" concentration of the Salton Sea is approximately 44,000 mg/liter (ocean water is approximately 35,000 mg/liter) and contains higher levels of sulfates than ocean water.

The Salton Sea periodically suffers from severe oxygen depletion events. During those events, the entire water column has dissolved oxygen concentrations of less than 1 mg/L. Oxygen depletion is thought to be caused primarily by the decomposition of algal blooms. Biochemical and chemical oxygen demand created by suspended sediments may also contribute to increased oxygen demand.

Large amounts of Nitrogen and Phosphorous are discharged into the Salton Sea each year from agricultural drains and the New, Alamo and Whitewater Rivers.

Additional water quality information is attached in Appendix A, contained herein.

Our Needs

We seek greater understanding of whether biological remediation processes can improve water quality and associated beneficial uses of the Sea. Specifically, can biological remediation of Salton Sea water or its inflows:

- Reduce or eliminate the noxious odors that occur largely during the hot summer months?
- Reduce or eliminate fish kills?
- Reduce total dissolved solids (TDS) in the Sea?

Additionally, we wish to determine:

- How certain, or proven, is biological remediation of Salton Sea waters to address the above problems?
- If any waste streams are expected from biological remediation?
- If biological remediation can address the problems, how much will it cost to build and annually operate a full-scale system?

Proposal Requirements

All proposals should include the following components in order:

1. **Executive Summary:** Specify if the proposal is a research, assessment and/or bench/scale project (see following section). Summarize in one page or less the rest of the proposal.
2. **Context:** Describe your understanding of the Sea's water quality conditions and the application of biological remediation to address the Sea's problems. Describe, in general terms the justification for your approach.
3. **Qualifications:** Provide a brief summary of your qualifications of all key personnel. Include details, if any, in a separately bound appendix.
4. **Experience:**
 - Describe projects similar in scope/complexity that you have accomplished.
 - Identify references and phone number for each project identified.
 - Describe any experience/familiarity that you have with the problems and issues surrounding the Salton Sea.
 - Acknowledge any relationship that you have with any major Salton Sea stakeholder/interest group. If there are no relationships, state so.
 - Include contact names and information.
5. **Work Program:** Provide task descriptions. For proposals that include more than one component (research, assessment, or bench-/pilot project), distinguish in the work program between components. See below, under Proposal Components, for elements that your proposal must include in this and/or other sections.
6. **Schedule:** Include benchmarks for stages of accomplishment.
7. **Budget:** Prepare a budget, by task and major expenditure items. Describe your proposed reimbursement method.
8. **References:** Provide references and contacts for similar projects completed.

Proposal Components

Proposals may include any or all of the following components:

1. Research to further define the nature of water quality problems in order to determine if biological remediation can be effective.
2. Technical assessments of the applicability of various biological remediation options to address the water quality issues of the Salton Sea.
3. Bench- or pilot-scale projects to test one or more treatment processes.

Proposals can be focused on a single component or address two or all components.

1. Research Proposals or those which Include a Research Component:

- Identify why the research is needed to determine if biological remediation can be effective.
- Identify major data or understanding gaps, the methodology that will be used to fill those gaps and the products/end-points to be achieved as a result of the research activities.
- Place the research in context by identifying the stages of scientific activity that will be required, if warranted, to apply biological remediation technologies to the Salton Sea.

2. Technical Assessment Proposals or Proposals which Include an Assessment of Bioremediation Processes:

- Specify which types of bioremediation processes will be evaluated.
- If evaluation is limited to only certain types of processes within the broader array of bioremediation processes, explain why the evaluation is focusing on the processes selected.
- Describe the methodology and the criteria to be utilized for evaluating the effectiveness of each process type.
- Specify which water quality parameters (e.g. BOD, COD, DO, TDS nutrients, odors, etc) will be considered in the assessment. Describe why the water quality parameters were selected and why others were not.

3. Bench or Pilot-Scale Project Proposals or Proposals that Include Bench- or Pilot Scale Projects:

1. Which water quality parameters will the project treat, (e.g. BOD, DO, TDS, etc.)?
2. What is the target (s) for each water quality parameter?
3. What are the expected results of achieving the target at full-scale implementation (e.g. fewer fish kills)?

4. How will the effectiveness of treatment be measured?
5. Describe the size, scope and location of project, including support requirements for the facility (i.e., power, roads, etc.).
6. Describe the operational and maintenance program for the project, including the periodicity of treatment required to achieve and sustain targeted water quality levels (i.e., continuous, single, annual treatment, etc.)?
7. Describe the treatment process in as much detail as possible.
8. Does the project generate a waste stream? If so, what are the characteristics? If a waste stream exists, how should it be disposed of? Describe any potential for re-use of the waste stream.
9. Describe the stages of technical activity that will be required following the testing to achieve application of the technology to the Salton Sea (i.e., larger scale pilots, full scale application, etc.).
10. Describe, in as much detail as possible, **a full-scale implementation** of the process to address Salton Sea-wide water quality parameters:
 - a. What configuration of facilities (how many, how large) would be needed to treat the water to achieve desired levels for improvements in the parameters of concern?
 - b. What is the periodicity of treatment required to achieve and sustain targeted water quality levels (i.e. continuous, single, annual, etc.)
 - c. What is the estimated capital or construction budget?
 - d. What is the estimated operation, energy and maintenance costs per year?
 - e. What time span will be required to achieve improvement levels in the targeted water quality parameters?
 - f. Characterize the waste stream, if any, and the preferred disposal method.
 - g. What would the effect of inflows to the Sea being reduced from 1.35 million acre feet per year to 1.25 million acre feet year or 1.0 million acre feet year of incoming water be on the ability of the treatment process to achieve and sustain the "restoration" levels sought?
11. If the biological remediation is proprietary, state so.¹
12. Describe the relevant application of your technology(ies) or process(es) that address similar problems encountered elsewhere. Citations, available reports and/or references should be provided.

Budget

The Authority has not set a firm project budget. The budget should be commensurate with the level and type of activity. The Authority has sponsored research projects with budgets from \$10,000 to \$800,000. Historically, pilot projects involving construction and testing

¹ Proprietary information will be kept confidential
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have been allocated hundreds of thousands of dollars. Recently a firm requested \$200,000 from the Authority to support a pilot bioremediation project. While the request was not granted, it did lead to the development of this request for proposals.

Contract Requirements

The following represent likely minimum ***limits of insurance:*** Contractor shall maintain limits no less than:

General Liability: \$1,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

Automobile Liability: \$1,000,000 per accident for bodily injury and property damage.

Workers' Compensation and Employer's Liability: Workers' compensation limits as required by the Labor Code of the State of California. Employers Liability limits of \$1,000,000 per accident for bodily injury or disease. The insurer shall agree to waive all rights of subrogation against the Authority, its directors, officers, employees, agents and volunteers for losses paid under the terms of the insurance policy which arise from work performed by the contractor.

Data Collection

Proposals including the collection and assessment of data will be required to produce an acceptable Quality Assurance Project Plan (QAPP). Additional guidance in preparing the complete QAPP may be obtained from the QA coordinator:

Barry H. Gump, Ph.D.
Department of Chemistry
2555 East San Ramon Avenue M/S SB70
Fresno, CA 93740-8034
Phone: (559) 278-2683
Fax: (559) 278-4402
Email: barry_gump@csufresno.edu

or from EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA QA/R-5, October 1997 which is available on the Internet at:

<http://www.epa.gov/quality1/qs-docs/g4-final.pdf>

Evaluation and Selection of Process

Proposals are limited to the scope of work identified and will be evaluated based upon:

- Technical merit.
- Relative ability of your approach to be able to address the issues described and the questions offered under "Our Needs".
- Understanding of the Sea and the project.

- Qualifications
- Cost-effectiveness.

The evaluation process will take approximately 30 days. The Authority reserves the right, at their sole discretion, to reject any or all proposal(s) received as a result of this request, to negotiate with any qualified source, and to cancel in part or in its entirety this request for proposal. The receipt of proposals shall not in any way obligate the Authority, to enter into a contract of any kind.

The Authority will not be responsible in any manner for the costs associated or incurred with the preparation and submission of the proposals.

Submission of Proposals

Six copies of each proposal and one electronic version on 3.25" IBM-formatted diskette (WordPerfect 6.1 or earlier or Microsoft Word for Windows 6.0) are required to be received at the office of the Authority, **no later** than January 14, 2002, 5:00 P.M., Pacific Standard Time. Proposals need to be addressed to:

Daniel Cain, Staff Analyst
Salton Sea Science Office
78-401 Highway 111, Suite T
La Quinta, CA 92253
Email: dcain@saltonsea.ca.gov

Proposals received after the deadline will not be opened. Proposals received via facsimile or E-mail will not be accepted. Written questions about this RFP will be accepted and time permitting, may be addressed. A record of the questions and responses will be posted on the Salton Sea page of the U.S. Bureau of Reclamation's Lower Colorado River Region website: <http://www.lc.usbr.gov>

APPENDIX "A"



SALTON SEA WATER QUALITY SUMMARY

Samples taken February 17 and 18, May 12 and 13, August 10 and 11, and November 16 and 17, 1999

		Ortho-P mg/L	Total P mg/L	NH3-N mg/L	NO3/NO2-N mg/L	TKN mg/L	DOC mg/L	DSI mg/L	TN/TP	DIN/SRP	Ca (diss.) mg/L	Mg (diss.) mg/L	Na (diss.) mg/L	K (diss.) mg/L	HCO3- mg/L	CO3= mg/L	SO4= mg/L	Cl- mg/L	F-?, Alk. mg/L, CO3/L	T. Alk. mgCaCO3/L	TSS mg/L	TDS mg/L	
Alamo River	Mean	0.388	0.712	1.25	6.15	2.9	4.2	5.89	14.9	23.6	166	83	389	8.17	259	0	762	443	1.2	0	240	357	2023
	Maximum	0.969	1.21	2.83	8.15	5.4	32	7.62	39.6	0.57	176	92.3	431	9.69	276	0	854	496	1.9	0	289	480	2349
	Minimum	0.142	0.194	0.307	4.46	0.9	3.6	4.81	8.3	9.9	151	73.7	331	6.32	252	0	655	346	0.52	0	202	237	1752
New River	Mean	671	1.098	3.82	3.39	4.8	8.8	7.3	7.8	12.1	177	82.8	566	12.6	300	0	716	724	1.8	0	268	217	2442
	Maximum	1.11	1.47	13.9	4.94	6.5	16.5	9.3	12.3	36.2	185	90.6	640	14.3	321	0	867	926	4	0	303	332	2835
	Minimum	0.299	0.662	2.32	1.98	2.4	4.5	5.94	4.6	5.8	163	76.8	508	10.1	289	0	616	469	0.52	0	218	87	1446
Whitewater River	Mean	0.703	0.855	0.636	14.7	2	7.6	8.62	20.6	23.7	122	32.2	303	9	245	0	527	235	2.6	0	227	96	1553
	Maximum	1.17	1.17	2.29	19.7	3.2	14	10.62	36.4	50.2	145	36.4	338	10	259	0	614	287	3.2	0	309	188	2622
	Minimum	0.374	0.529	0.144	11.3	0.8	2.2	7.2	15.5	12	113	29.7	276	8.43	231	0	423	194	2	0	178	40	1199
SS-1 (Surface)	Mean	0.02	0.08	1.28	0.153	3.8	43.1	4.19	124.3	183.8	955	1392	12320	258	252	0	10700	17900	2	57	251	49	43889
	Maximum	0.084	0.19	2.98	0.348	5.2	59	6.45	490	938	1010	1450	12900	272	254	0	11400	19300	2.1	116	434	179	45432
	Minimum	<0.005	<0.005	0.019	<0.030	2	20.8	2.36	14.4	23.2	850	1350	11900	244	248	0	10200	16000	2	0	196	9	41337
SS-1 (Bottom)	Mean	0.013	0.059	1.65	0.066	4.1	40.9	5.38	257.2	386.9	961	1422	12560	261	255	0	10855	17460	2	35	253	25	43759
	Maximum	0.076	0.131	3.25	0.154	6.2	55	6.82	2006	1242	1110	1570	13500	272	270	0	11700	18900	2.1	92	411	48	45236
	Minimum	<0.005	<0.005	2.18	<0.030	1.5	25.2	3.99	16.4	33.8	839	1330	12000	244	244	0	9820	15900	2	0	190	13	40736
SS-2 (Surface)	Mean	0.016	0.069	0.861	0.149	4	41.6	3.9	198.4	213.3	930	1364	12220	257	236	9	10168	17260	2.1	47	238	37	43794
	Maximum	0.1	0.15	1.83	0.38	7.8	53	6.68	1326	588	1010	1430	12700	270	256	28	10600	18300	2.1	83	349	89	46335
	Minimum	<0.005	<0.005	<0.010	<0.030	1.8	17	1.5	15.9	18.5	806	1320	11900	242	189	0	9370	15700	2.1	0	192	16	41537
SS-2 (Bottom)	Mean	0.019	0.056	1.39	0.123	3.9	41.4	5.06	283.6	269.8	937	1402	12380	259	251	0	10515	16600	2.1	34	246	26	44124
	Maximum	0.087	0.129	2.94	0.605	5.3	50.5	6.9	1802	1182	1030	1440	12600	269	256	0	11300	18700	2.2	70	389	45	47109
	Minimum	<0.005	<0.005	0.317	0.03	1.2	25.5	3.5	13.8	22.1	822	1340	12100	252	245	0	9760	15000	2.1	0	202	10	43292
SS-3 (Surface)	Mean	0.02	0.065	0.954	0.124	3.8	42.7	4.19	202.2	184.4	942	1400	12360	259	234	10	10505	18620	2	50	233	39	44054
	Maximum	0.098	0.222	1.79	0.557	5.3	65.1	6.5	1286	634	1030	1490	13300	276	256	31	11500	22600	2.1	103	330	146	45977
	Minimum	0.005	<0.005	0.1	<0.030	1.8	22.8	2.66	17.5	16	789	1300	12000	251	183	0	9620	16700	2	0	198	17	43066
SS-3 (Bottom)	Mean	0.017	0.061	1.62	0.186	4.2	41.4	5.44	268.3	447.2	929	1386	12220	257	268	0	10345	16980	2.1	32	245	26	43888
	Maximum	0.1	0.138	3.44	0.894	7.2	53	8.55	2086	1366	1030	1460	13000	272	317	0	11600	18200	2.1	77	331	38	46159
	Minimum	<0.005	<0.005	0.18	<0.030	1.3	23.3	3.88	13	15.7	775	1260	11700	245	247	0	9630	15100	2	0	202	15	42661

Source: Chris Holdren & Andrew Montano, U.S. Bureau of Reclamation

